

Vacuum Group Procedure VA-008.18.1.45
Original Issue Date: 01/01/00
Revision 01

****IMPORTANT****

PRIOR TO THE PERFORMANCE OF ANY WORK WITHIN THE SCOPE OF THIS PROCEDURE, IT IS THE RESPONSIBILITY OF THE SUPERVISOR TO ENSURE THAT ***WORK PLANNING*** HAS BEEN REVIEWED FOR THE PROTECTION OF WORKERS, EQUIPMENT, AND THE ENVIRONMENT.

THROUGHPUT MEASUREMENT PROCEDURE

BEFORE STARTING PROCEDURE:

Check the maintenance records and perform any scheduled roughing station servicing required at this time. Verify all roughing station fluids are at their proper levels.

START-UP PROCEDURE

- 1) Roll cart to roughing station (RS).
- 2) Plug electrical cord from cart into the RS electrical control box (ECB).
- 3) Switch on "MAIN PWR" and "STA ONE" buttons the red and white buttons left of center) on the CVC control panel (CP).
- 4) Verify the following are closed.
 - Wallace-Tiernan gauge (WTV) isolation valve
 - test volume inlet valve (TVV)
 - test volume vent valve VV)
 - variable leak valve (VLV)
- 5) Open nitrogen supply bottle (NS), pressurize nitrogen test gauge (NTG) to 1-2 PSIG.
- 6) Close NS. Vent nitrogen pressure by opening nitrogen vent valve (NVV). Once NTG returns to zero PSIG close NVV.
- 7) Open TVV, equalizing the pressure between the test volume and the nitrogen supply line, and then close the TVV.
- 8) Verifying the RS isolation valve is closed, remove snake assembly from the turbo pump inlet, if required, and wrap in aluminum foil.
- 9) Attach test flange and hose assembly to turbo pump inlet using the marmon clamp assembly.
- 10) Attach the instrument test cables from the cart to the cold cathode gauge (CCG) and the RCG mounted on the turbo pump instrument tree.
- 11) Before attaching the local control box (LCB) to the RS verify all switches are in the "OFF" or "CLOSED" position.
- 12) Verify the red light is illuminated signifying the RS isolation valve is closed.
- 13) Verify the backing valve (BV) between the mechanical land turbo pumps is open.
- 14) Push DK20 (red) button tuning on the mechanical pump.
- 15) Allow the mechanical pump to pump down to approximately 1 TORR on the Granville-Phillips gauge (GP).
- 16) Place the ECB ammeter switch to "SHUNT" position.
- 17) Turn on the turbo pump by switching the "2" VALVE" switch to open and the "BLOWER PUMP" switch to "ON" simultaneously.
- 18) As the GP reaches its lower limit switch on the CCG by depressing the red button on the right side of the CP.
- 19) Allow turbo to come up to running speed. Place ECB ammeter switch to "AMMETER" position, verify the turbo running current is between .6-.8 amperes.
- 20) Leak check turbo and snake assembly via the leak detection test valve (LDTV).
- 21) After leak check attaché thermocouple gauge (TCG) with throughput tube to the leak detection test valve (LDTV).
- 22) Remove the instrument test cable from the TCG on the turbo pump inlet and connect it to the TCG attached to the LDTV.

- 23) Slowly open the LDTV allowing the turbo to accept the air contained in the TCG and the throughput tube.
- 24) Open TVV.

WARNING:

Pressure reading on the Wallace-Tiernan Gauge is not to exceed 15.2 PSIA. If pressure surpasses 15.0 PSIA close the WTV immediately.

- 25) Using caution, slowly valve-in the Wallace-Tiernan gauge (WG) by opening the WTV.
 - a. If the value on the WG is less than 15.0 PSIA close the TVV.
 - b. If the value on the WG approaches 15.2 PSIA close the WTV. Open the NVV. Allow the excess pressure to vent. Close the NVV and the TVV. Repeat step 25.

THROUGHPUT MEASUREMENT PROCEDURE

MEASUREMENT GUIDELINES: Pressure readings should lead the marking of time~ that is~ the first reading from the Wallace-Tiernan gauge should be made as dial clearly points to an increment of pressure. then time measurement begins. The second pressure reading should also be taken as the dial indicates another distinct pressure increment. This should be done on 01- about the time periods indicated, and then time measurement ends.

- 26) Open the VLV until a base pressure of 5×10^{-6} TORR is seen on the CCG readout.
- 27) Simultaneously, take a pressure reading from the WG and mark time using a stopwatch or a wristwatch with a second hand. [Use the guidelines noted on the THROUGH-PUT/PUMPING SPEED form.]
- 28) Take a second pressure reading from the WG after 60 minutes have elapsed.
- 29) Divide the difference of the two pressure readings by the time elapsed. Multiply this result by 20.16 (the product of the known volume and the PSI to TORR conversion factor). The result is throughput in TORR-LITERS/SECOND.
- 30) Divide the throughput by the test pressure. The result is the pumping speed of the roughing station at the gas load present in the base pressure.
- 31) Repeat steps 26 through 30 for CCG/test pressures indicated on the THROUGHPUT/PUMPING SPEED form.
- 32) Close the WTV.
- 33) Transfer the TCG cable from LDTV-TCG to the turbo-TCG.
- 34) Open the NS. Establish and maintain 1-2 PSIG on the NTG.
- 35) Set the VLV such that the CCG reads 5×10^{-4} TORR then cut power to the CCG (red button on the right of CVC panel).
- 36) Switch "2" VALVE" switch to close and the "BLOWER PUMP" switch to off simultaneously.
- 37) Close BV and LDTV, push DK20 "off" BUTTON (Green).
- 38) Open TW.
- 39) As GP approaches 1 TORR open VLV to full open.
- 40) As GP approaches 760 TORR, close VALVE to stop.
- 41) Close NS.

- 42) Open NVV to vent pressure, close NVV and then close the TVV.
- 43) Unplug both power cords from RS. Remove instrument test cables and LCB from RS. Reconnect RS control cable to ECB.
- 44) Secure all cart cables and cord to cart.
- 45) Remove the TCG with the throughout tube from the LDTV.
- 46) Once turbo has stopped open the BV.
- 47) Remove marmon clamp assembly from turbo. Remove aluminum foil from snake assembly. Replace snake assembly and marmon clamp assembly on turbo pump.
- 48) Wrap marmon flange of cart with aluminum foil and secure to cart.
- 49) Roll cart to next RS.